

AGRICULTURAL MECHANICS

CONTEST OVERVIEW

The Missouri State Agricultural Mechanics Contest shall reflect the agricultural mechanics instruction provided contestants in Missouri secondary agriculture departments. Specifically, the skill and problem solving activities shall reflect the competencies included in the Missouri Agricultural Mechanics curriculum. Agricultural Mechanics competencies shall include the areas of agricultural machinery, small engine power, tractor power, agricultural electrification, woodwork and carpentry, concrete and plumbing, metal fabrication, soil and water management, and repair and maintenance. The written examination, skill activities, and problem solving activities will be conducted to assess the participants' knowledge of these agricultural mechanics competencies. Agricultural Mechanics competency profiles are available through the Instructional Materials Laboratory.

Contest Objectives:

The overall purpose of the Agricultural Mechanics Contest is to motivate contestants to greater learning by providing an opportunity to apply classroom knowledge in a competitive situation and to promote state-of-the-art Agricultural Mechanics programs within the State of Missouri.

Contestants in the Agricultural Mechanics Contest should have developed the following competencies:

Agricultural Machinery

The contestant should be able to perform the competencies identified in the Missouri Agricultural Machinery Curriculum. Subtopics include operating and maintaining: power units; primary tillage equipment; secondary tillage equipment; planting equipment; chemical applicators; harvesting equipment; and materials and handling equipment.

Small Engine Power

The contestant should be able to perform the competencies identified in the Missouri Agricultural Power I Curriculum. Subtopics include: using measuring tools, principles of operation; using shop tools and equipment; selecting engine parts and fasteners; using a service manual; testing and analyzing a single cylinder engine system; and servicing a single cylinder engine.

Tractor Power

The contestant should be able to perform the competencies identified in the Missouri Agricultural Power II Curriculum. Subtopics include: principles of operation; testing and analyze the multi-cylinder components; servicing a multi-cylinder engine; and servicing the power train.

Agricultural Electrification (circuits and motors)

The contestant should be able to perform the competencies identified in the Missouri Agricultural Structures II Curriculum, Unit D, Agricultural Structures I Curriculum, Unit B, Competency Number 7, and the following specific competencies not in the curriculum that pertain to electrical motors: selecting motors based on the type of application; interpreting motor nameplate data; interpreting motor wiring connection diagrams; servicing electric motors; connecting motor drives; identifying motors and motor parts; and identifying methods of providing motor protection. References for electric motors are listed in the National FFA Career Development Events, Agricultural Mechanics Section, Pages 13-14.

Woodwork and Carpentry

The contestant should be able to perform the competencies identified in the Missouri Agricultural Construction Curriculum, Units C and E; Agricultural Structures Curriculum I, Unit A; Agricultural Structures Curriculum II, Unit B; Agricultural Science I Curriculum, Material Selection, Plan Reading, and Interpretation Unit; and Agricultural Science II Curriculum, Power Tools Unit.

Concrete and Plumbing

The contestant should be able to perform the competencies identified in the Missouri Agricultural Structures Curriculum I, Unit B; Agricultural Structures Curriculum II, Units A and E.

Metal Fabrication (arc or mig and oxy-acetylene welding)

The contestant should be able to perform the arc welding and oxy-acetylene welding competencies identified in the Missouri Agricultural Science I and II Curriculum materials; Agricultural Construction Unit A, Competencies 1 to 4; and the Agricultural Construction Unit B, Competencies 1 to 10.

Soil and Water Management

The contestant should be able to perform the following competencies in addition to those identified in the current curriculum: describing principles involved in appropriate conservation and/or land use planning; reading legal land descriptions; determining land area; determining the percent of slope or grade; leveling a leveling instrument; using a hand level; taking rod readings; measuring

distances with tapes or instruments; laying out corners using instruments; recording field notes for differential and profile leveling; laying out foundations, footings, and batter boards; laying out a contour line; measuring crop residue on the land; determining soil losses; and determine the cubic feet of dirt to move. The contestant should also be able to perform the competencies identified in the Missouri Agricultural Advanced Crop Production Unit C, "Soil Conservation." References for Soil and Water Management are listed in the National FFA Career Development Events Bulletin, Agricultural Mechanics Section, pages 13-14.

Repair and Maintenance (tool ID, sharpening and adjustment, hot metal and cold metal)

The contestant should be able to perform the competencies identified in the Missouri Agricultural Construction Curriculum, Unit D; Agricultural Science I Curriculum, Tool Sharpening and Reconditioning; Agricultural Science I, Woodworking Unit; Agricultural Power I, Units B and C; Agricultural Science II Curriculum, Tool Sharpening and Reconditioning and Cold Metal Work.

Written Examination

The contestant should be knowledgeable about all six areas designated for that respective year.

CONTEST FORMAT AND SCORING

1. The three major contest sections and associated skill/problem solving areas rotate in the following manner:

CONTEST FORMAT AND ROTATION Skill and Problem Solving Activities			
Section	Area	Odd Years	Even Years
Ag. Power & Machinery	Ag. Machinery	Ag. Machinery	Ag. Machinery
	Small Engine Power	Small Engine Power	
	Tractor Power		Tractor Power
Ag. Structures & Electricity	Ag. Electrification	Circuits	Motors
	Woodworking and Carpentry	Woodworking and Carpentry	
	Concrete and Plumbing		Concrete and Plumbing
Ag. Construction & Soil & Water Management	Metal Fabrication	Arc or Mig	Oxy
	Soil and Water Management	Soil and Water Management	
	Repair and Maintenance		Repair and Maintenance

2. Each contestant will compete in each area of the contest. Each contestant will take the written examination.
3. Work will be judged on accuracy, workmanship, and the ability to interpret instructions, plans, and drawings.
4. Each contestant will be allowed 20 minutes to perform the activities in each skill/problem solving area. Each contestant will be allowed 60 minutes to complete the written examination.
5. Skill activity sheets for the district agricultural mechanics contest will be distributed at the January district meeting. A brief preview of the contest will be provided at the district meetings.
6. Pictures or slides may be used in any area rather than actual items.
7. Problem solving may be a part of the contest in any area. The use of computers may be incorporated into the solving of problems that are associated with the six areas designated for that respective year.
8. Practice metal will be provided if necessary. DO NOT bring metal to practice on.
9. Only tools listed on Form 1 (included in following pages) will be used for the tool identification, sharpening, and adjustment skill activity. The contestant should look for the major defect or improper adjustment as they complete this part of the contest and indicate Useable or Nonuseable under Working Condition.
10. Only parts and tools listed on Form 76 will be used for Ag. Power I.D. Section.
11. The written examination will be an objective test covering the six areas designated for that year.
12. Each skill activity will be worth 50 points. The written examination will be worth 100 points. As such, an individual could earn 400 points; each team could earn a total of 1200 points.

CONTEST RULES

1. Contestants shall not communicate with any person other than the persons in charge of the contest.

2. Each contestant must bring the following materials:

Odd Years

1. #2 lead pencil
2. Clean clipboard
3. Safety glasses
4. Arc or Mig welding helmet
5. Welding gloves
6. Chipping hammer

Even Years

1. #2 lead pencil
2. Clean clipboard
3. Safety glasses
4. Oxy-acetylene goggles
5. Welding gloves

No contestant will be permitted to participate without the previous listed equipment.

3. Each team will consist of three members who have qualified by participating at a district contest.
4. Only contestants and contest workers will be allowed in the contest area during the contest. Teachers will be allowed to view the contest set-up only after the contest is completed. Teachers will not be allowed to communicate with the judges until contest grading has been completed.
5. No contest papers will be returned after the contest.
6. Time allowances will be made by the contest superintendent or assistants for equipment breakdowns or improperly functioning equipment.
7. Contestants will wear safety eye protection during all skill activities. Contestants will not be allowed to compete in an activity without their own safety glasses. Sharing of safety glasses with fellow team members or other contestants will not be allowed.
8. Arc welding and oxy-acetylene participants must wear appropriate clothing and shoes. (i.e. long pants, coveralls or overalls; long sleeve shirt; and leather shoes or boots). All exposed skin must be covered. **NO tennis shoes or sandals will be permitted.**
9. List of machinery for state contest will be available by March 1st of the contest year on the UMC Agricultural Engineering website (<http://www.missouri.edu/~pavt0689/statecon.html>) or by calling the UMC Agricultural Engineering office (573-882-2731).

REFERENCES

References for the contest are those listed for the respective areas of the Missouri Agricultural Science I and II; Agricultural Structures; Agricultural Power I and II; Agricultural Machinery, and Agricultural Construction Curricula.

References are listed in the Career Development Events Bulletin, Agricultural Mechanics Section:

1. FOS - John Deere
2. *Agricultural Power and Machinery*. McGraw-Hill.
3. *Mechanics in Agriculture*. Interstate Publishers.
4. *Agricultural Mechanics Fundamentals and Applications*. Delmar Publishers.
5. *Modern Agricultural Mechanics*. Interstate Printers and Publishers.
6. *Developing Shop Safety Skills*. American Association for Vocational Instructional Materials (available from UMC-IML).
7. *Power Tool Safety and Operation*. Hobar (available from UMC-IML).
8. *Agricultural Mechanics I Lesson Plans*. UMC-IML.
9. *Agricultural Mechanics II Lesson Plans*. UMC-IML.
10. *Agricultural Buildings and Structures*. Reston Publications.
11. *Practical Farm Buildings*. Interstate Publishers.
12. *National Electrical Code (1993 edition)*. NFPA
13. *Agricultural Structures*. UMC-IML.
14. National FFA Agricultural Mechanics web site:
<http://web.missouri.edu/~pavt0689/natcon.html>.

MISSOURI AGRICULTURAL MECHANICS CONTEST

AG POWER: SMALL ENGINE PARTS AND TOOL LIST

Tool Number	TOOLS	Tool Number	GENERAL
_____	Tachometer	_____	Air Cleaner Cartridge
_____	Voltmeter	_____	Breather Tube
_____	Ohmmeter	_____	Bushing
_____	Ammeter	_____	Clutch (Starter)
_____	Spark Tester	_____	Connecting Lock/Screw Lock
_____	Compression Tester	_____	Crankcase Breather
_____	Dial Indicator	_____	Cylinder Head Screw (Head Bolt)
_____	Dial Caliper	_____	Flywheel Key
_____	Torque Wrench	_____	Flywheel Guard
_____	Micrometer	_____	Governor Blade
_____	Telescope Gauge	_____	Governor Link
_____	Hole Gauge	_____	Governor Spring
_____	Feeler Gauge	_____	Housing Blower (Shroud)
_____	Wire Feeler Gauge	_____	Muffler
_____	Plug Gauge (Go-no-Go)	_____	Oil Slinger (Dipper)
_____	Valve Seat Refacer	_____	Piston Cap
_____	Valve Lapper	_____	Piston Pin
_____	Valve Seat Cutter	_____	Piston Rod
_____	Valve Grinder	_____	Screen-Rotating
_____	Valve Seal Puller	_____	Spring Washer (Flywheel Washer)
_____	Pilots		
_____	Driver		
_____	Support Jack		PISTON RINGS
_____	Flywheel Puller	_____	Compression
_____	Flywheel Holder	_____	Oil
_____	Starter Clutch Wrench	_____	Scraper
_____	Valve Spring Compressor		
_____	Piston Ring Compressor		IGNITION
_____	Condensor Spring Compressor	_____	Breaker Points
_____	Piston Ring Grover	_____	Breaker Points (Plunger)
_____	Reamer	_____	Breaker Points (Spring)
_____	Cylinder Hone	_____	Condenser
_____	Counterbore Cutter	_____	Cover (Points)
_____	Carbon Ring Remover	_____	Flywheel
		_____	Magneto (Armature)
		_____	Spark Plug
	CARBURETOR		GASKETS
_____	Flow-jet	_____	Air Cleaner
_____	Vacu-jet	_____	Crankcase
_____	Pulsa-jet	_____	Head
		_____	Valve Cover (crankcase breather)
	PRIMARY		
_____	Cam Gear		VALVE
_____	Crankcase Cover (Oil Sump)	_____	Exhaust
_____	Crankshaft	_____	Intake
_____	Cylinder (Block)	_____	Spring
_____	Cylinder Head	_____	Spring Retainer
_____	Fuel Tank	_____	Tappet
_____	Piston		

Missouri Agricultural Mechanics Contest
Tool Identification, Fitting and Adjustment Skill Activity

Name: _____ Contestant Number _____

School: _____ School Number: _____

<u>Tool No.</u>	<u>Condition</u>				<u>Tool No.</u>	<u>Condition</u>			
1. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	26. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
2. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	27. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
3. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	28. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
4. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	29. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
5. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	30. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
6. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	31. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
7. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	32. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
8. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	33. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
9. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	34. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
10. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	35. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
11. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	36. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
12. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	37. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
13. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	38. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
14. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	39. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
15. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	40. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
16. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	41. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
17. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	42. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
18. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	43. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
19. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	44. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
20. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	45. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
21. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	46. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
22. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	47. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
23. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	48. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
24. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	49. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
25. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	50. _____	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>

Missouri Agricultural Mechanics Contest

Tool Identification, Fitting and Adjustment Skill Listing

- | | | |
|----------------------------------|----------------------------------|----------------------------------|
| 1. Bit, Auger | 47. Hammer, Ball Peen | 93. Ratchet, Flex Head |
| 2. Bit, Expansion Auger | 48. Hammer, Blacksmith | 94. Rivet, Set |
| 3. Bit, Masonry | 49. Hammer, Curved Claw | 95. Rivet, Pop Rivet Tool |
| 4. Bit, Router | 50. Hammer, Rawhide | 96. Saw, Back |
| 5. Bit, Screwdriver | 51. Hammer, Ripping | 97. Saw, Compass |
| 6. Bit, Wood Screw Pilot | 52. Hammer, Sheet Metal Setting | 98. Saw, Coping |
| 7. Bit, Spade | 53. Indicator, Dial | 99. Saw, Cross Cut |
| 8. Bolt Cutter | 54. Indicator, Speed | 100. Saw, Hack |
| 9. Brace, Ratchet | 55. Jacob's Chuck | 101. Saw Miter Box |
| 10. Caliper, Inside | 56. Level, Aluminum | 102. Saw, Rip |
| 11. Caliper, Outside | 57. Level, Mason's | 103. Scratch Awl |
| 12. Caliper, Vernier | 58. Level, Mechanic's | 104. Screwdriver, Standard |
| 13. Countersink | 59. Level, Line | 105. Screwdriver, Clutch Head |
| 14. Chalkline | 60. Mason's Trowel | 106. Screwdriver, Offset |
| 15. Chisel, Wood | 61. Micrometer, Inside | 107. Screwdriver, Phillips |
| 16. Chisel, Cold | 62. Micrometer, Outside | 108. Screwdriver, Torque |
| 17. Chisel, Diamond Point | 63. Nail Set | 109. Screw Extractor |
| 18. Chisel, Round Nose | 64. Nut Driver | 110. Sliding T Bevel |
| 19. Clamp, C | 65. Oil Stone | 111. Snips, Aviation |
| 20. Clamp, Corner | 66. Pipe Cutter | 112. Snips, Tinner |
| 21. Clamp, Three Way | 67. Pipe Die | 113. Socket, 4 Point |
| 22. Clamp, Bar | 68. Pipe Reamer | 114. Socket, 6 Point |
| 23. Die, Split Round Adjustable | 69. Pipe Tap | 115. Socket, 8 Point |
| 24. Die, Solid | 70. Plane, Jack | 116. Socket, 12 Point |
| 25. Die, Stock | 71. Plane, Block | 117. Socket, Universal |
| 26. Die, Two Piece Adjustable | 72. Plane, Surform | 118. Socket, Extension |
| 27. Dividers | 73. Plane, Hand | 119. Socket, Flex Handle |
| 28. Edger, Concrete | 74. Pliers, Combination | 120. Socket, Reducer/Adaptor |
| 29. File, Card | 75. Pliers, Diagonal Cutting | 121. Socket, Deep |
| 30. File, Flat Bastard | 76. Pliers, Groove Joint | 122. Socket, Speed Handle |
| 31. File, Flat Mill | 77. Pliers, Lineman's | 123. Socket, Spark Plug |
| 32. File, Half Round | 78. Pliers, Locking | 124. Square, Carpenter's Framing |
| 33. File, Wood | 79. Pliers, Locking Chain Wrench | 125. Square, Combination |
| 34. Float, Magnesium | 80. Pliers, Needle Nose | 126. Square, Steel |
| 35. Float, Steel | 81. Pliers, Slip Joint | 127. Square, Try |
| 36. Float, Wood | 82. Pliers, Water Hose Clamp | 128. Twist Drill, Morris Taper |
| 37. Gauge, Drill | 83. Pliers, Wire Stripper | 129. Twist Drill, Straight Shank |
| 38. Gauge, Flat Feeler | 84. Puller, Bearing | 130. Wrench, Adjustable End |
| 39. Gauge, Spark Plug Feeler | 85. Puller, External Gear | 131. Wrench, Box |
| 40. Gauge, Small Hole | 86. Puller, Internal Gear | 132. Wrench, Combination |
| 41. Gauge, Marking | 87. Puller, Nail | 133. Wrench, Pounds-Foot Torque |
| 42. Gauge, Screw Pitch | 88. Punch, Center | 134. Wrench, Impact |
| 43. Gauge, Telescoping | 89. Punch, Drive Pin | 135. Wrench, Pounds-Inch Torque |
| 44. Gauge, Wire | 90. Punch, Lining-Up | 136. Wrench, Tap |
| 45. Gauge, Sheet and Plate Metal | 91. Putty Knife | 137. Wrench, Ratcheting B |
| 46. Grinding Wheel Dresser | 92. Ratchet, Reversible | |